

IIP Docket No. 100202667-1

REMARKS

Applicants appreciate the Office's review of the present application. In response to the Office Action, the cited references have been reviewed, and the rejections and objections made to the claims by the Examiner have been considered. The claims presently on file in the present application are believed to be patentably distinguishable over the cited references, and therefore allowance of these claims is earnestly solicited.

In order to render the claims more clear and definite, and to emphasize the patentable novelty thereof, claims 1, 6, 14-15, 17, and 33-34 have been amended, and new claims 37-39 have been added. Support for any claim amendments and new claims is found in the specification, claims, and drawings as originally filed, and no new matter has been added. Accordingly, all claims presently on file in the subject application are in condition for immediate allowance, and such action is respectfully requested.

Rejections**Rejection Under 35USC §103**

Claims 1-2 have been rejected under 35 USC §103(a), as being unpatentable over U.S. patent 6,296,350 to Cornell et al. ("Cornell") in view of U.S. patent 6,612,673 to Giere et al. ("Giere"). Applicants respectfully traverse the rejection and request reconsideration.

As to a rejection under §103(a), the U.S. Patent and Trademark Office ("USPTO") has the burden under §103 to establish a *prima facie* case of obviousness by showing some objective teaching in the prior art or generally available knowledge of one of ordinary skill in the art that would lead that individual to the claimed invention. See In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). The Manual of Patent Examining Procedure (MPEP) section 2143 discusses the requirements of a *prima facie* case for obviousness. That section provides as follows:

Page 11 of 25

HP Docket No. 100202667-1

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and reasonable expectation of success must be found in the prior art, and not based on applicant's disclosure.

The rejection of independent claim 1, and its dependent claim 2, is respectfully traversed for at least the following reasons. Claim 1 recites:

1. (Currently amended) A printing system, comprising:
an inkjet printhead having plural portions each having an ink-ejecting nozzle;
plural heater elements each associated with one of said plural portions to pre-warm ink dispensed by the nozzle of said associated portion in response to a pre-warming signal; and
a controller configured to
analyze an upcoming print swath to determine which of said plural portions are required to eject ink in order to print the swath in accordance with a predefined selection criteria,
and
before starting to print the swath, supply the pre-warming signal to one or more heater elements of only the portions required to eject ink to print the swath in accordance with the predefined selection criteria." (emphasis added)

The Office has not established a *prima facie* case of obviousness at least because the applied references do not teach or suggest all of Applicant's claim limitations.

With regard to the limitation of a controller configured to supply the pre-warming signal to heater elements of only the portions of the printhead required to eject ink to print the swath in accordance with the predefined selection criteria, the Office states that such is taught by the Cornell reference. However, the Office Action does not specify, and Applicants do not understand, what element of the Cornell reference the Office considers the predefined selection criteria to be. If the rejection is maintained, it would be appreciated if the Office would specifically identify this in accordance with 37 CFR §1.104(c)(2), which requires that the features in the references that allegedly correspond to the limitations of the claims be pointed out

HP Docket No. 100202667-1

with specificity.

Furthermore, this limitation has been amended herein to recite that the pre-warming signal is supplied before starting to print the swath. Support for this amendment may be found, for example, at page 3, lines 10-12 of Applicants' specification. Such a limitation is not taught or suggested by the cited references, alone or in combination.

The Cornell reference discloses an inkjet printer in which print

"cartridges 20 and 30 are supported in a carrier 40 which, in turn, is slidably supported on a guide rail 42. A drive mechanism 44 is provided for effecting reciprocating movement of the carrier 40 back and forth along the guide rail 42. The drive mechanism 44 includes a motor 44a with a drive pulley 44b and a drive belt 44c which extends about the drive pulley 44b and an idler pulley 44d. The carrier 40 is fixedly connected to the drive belt 44c so as to move with the drive belt 44c. Operation of the motor 44a effects back and forth movement of the drive belt 44c and, hence, back and forth movement of the carrier 40 and the print cartridges 20 and 30. As the print cartridges 20 and 30 move back and forth, they eject ink droplets onto a paper substrate 12 provided below them." (col. 2, lines 20-34; emphasis added)

With regard to the ejection of ink droplets, the Cornell references discloses that the printer

"includes a driver circuit, electrically coupled to the print cartridge, for applying to the resistive heating element warming and firing pulses separated by a delay period. The warming pulse causes the resistive heating element to warm a portion of the ink adjacent to the heating element and the firing pulse causes the resistive heating element to produce a vapor bubble in the chamber which causes a droplet of ink to be ejected from the chamber orifice." (Abstract; emphasis added)

"Assuming that the delay period is not too long or too short, the first and second quantities of thermal energy result in the formation of an ejection bubble having increased momentum. Such a bubble causes the resulting ejected ink droplet to likewise have increased momentum. The increased momentum, however, is due to a significant extent to an increase in velocity rather than droplet mass. The droplets ejected by the printing apparatus of the present invention, because of their increased velocity, are less likely to be diverted from their intended straight-line paths by ink which has collected on the outer surface of the printhead." (col. 1, lines 47-57; emphasis added)

"The delay period is preferably from about 0.5 us to about 2.0 us. ... An acceptable balance is believed to exist between ink-heating element interface temperature and thermal diffusion when the delay period is from about 0.5 us to about 2.0 us." (col. 5, lines 38-53;

HP Docket No. 100202667-1

emphasis added)

Thus, for a particular resistive heating element, the acceptable delay period between the warming pulse and the firing pulse is from about 0.5 microseconds to about 2.0 microseconds. Furthermore, the period of the corresponding warming pulse is from about 0.1 microsecond to about 0.5 microseconds (col. 7, lines 52-54).

The Cornell reference does not teach that the warming signal is supplied to the heater elements of only the portions required to eject ink before starting to print the swath, as required by Applicants' claim 1. Instead, the Cornell reference teaches that the warming signal is supplied to the heater elements during the printing of the swath. The sequence of warming as taught by the Cornell reference, including its driver circuit, occurs at the time printing is performed. For each cell, the 0.1-0.5 microsecond warming pulse is issued to the resistive heating element only 0.5-2.0 microseconds before the firing pulse which ejects the ink onto the media at a location adjacent the position of the print cartridge. Such timing requirements are incompatible with prewarming before starting to print the swath.

The Cornell reference cannot teach the limitation that the warming signal is supplied to the heater elements of only the portions required to eject ink before starting to print the swath. Due to the scanning printing operation of the printer in which the print cartridges are moved reciprocally over the print media at the speed of the motor in order to print a swath on the media, different locations of the swath are printed at different times. If the warming signal were to be supplied to the heater elements before starting to print the swath, then the warming pulse period, the delay period, or both for many if not most of the ejection elements would far exceed the timing tolerances specified by the Cornell reference for proper ink drop ejection. The motor / drive pulley / drive belt mechanical system of the Cornell reference moves the print cartridges along the guide rail at a rate which is at least several orders of magnitude too slow to allow the ink ejection elements for locations on the media offset from the position of the cartridge at the time printing begins to be operated anywhere near the required warming pulse period and delay period.

HP Docket No. 100202667-1

Furthermore, in order to supply the pre-warming signal to heater elements of only the portions of the printhead required to eject ink to print the swath before starting to print the swath, an analyzer that analyzes the upcoming print swath to determine which of the portions are required to eject ink in order to print the swath is required. The Office admits that the Cornell reference does not teach such an analyzer (Office Action, p.4), but states that the Giere reference does.

However, to whatever extent that the Giere reference may teach or suggest that the controller analyzes an upcoming print swath (col. 8, lines 20-26), the Giere reference does not teach or suggest supplying the pre-warming signal to only the portions required to eject ink, as recited in claim 1. In fact, the Giere reference teaches just the opposite: “The temperature logic system also generates firing voltages 814 and activates heater elements that do not eject ink 816” (col. 9, lines 17-19; Fig. 8; emphasis added).

In addition, the Giere reference does not teach or suggest that the analysis determines which of the plural portions of the printhead are required to eject ink in order to print the swath in accordance with a predefined selection criteria, as recited in claim 1. No such predefined selection criteria is identified by the Office, or taught or suggested in the Giere reference.

Therefore, for the reasons discussed herein, the applied references do not teach or suggest all of Applicant's claim limitations.

In addition, the Office has not established a *prima facie* case of obviousness at least because there is no suggestion or motivation to modify the reference or to combine reference teachings. It is respectfully believed that the motivation provided by the Office (“to improve ink drop quality”) is a conclusory statement of generalized advantages and convenient assumptions that are too vague and not specific enough to ascertain a motivation in one or the other for combining.

Furthermore, the Giere reference teaches away from Applicants' invention as recited in claim 1. Because the Giere reference teaches that heater elements that do not eject ink are activated

HP Docket No. 100202667-1

as part of performing the pre-warming function, a person of ordinary skill in the art would be discouraged from taking the opposite approach recited in Applicants' claim 1, where the pre-warming signal is supplied to only those portions of the printhead that are required to eject ink. As such, there is no motivation to modify or combine the teachings of the Cornell and Giere references to arrive at Applicants' invention as recited in claim 1.

Also, the proposed modification or combination of references, even if obvious, would not produce the claimed invention in that the combination would be inoperative to produce the intended results. As discussed above, the ink ejection operation of the cells of the Cornell reference require microsecond warming pulse durations and microsecond intervals between the warming pulse and the firing pulse, times that are not achievable with its mechanical scanning mechanism. And even if prewarming before starting to print the swath could be somehow implemented in the system of Cornell, how would this prewarming interact with the warming-delay-firing operation of the cells during printing? What would be the effect on drop velocity/momentum, and resulting print quality? Considerable experimentation would likely be required in order to determine feasibility, much less desirability, such a need for experimentation is a contraindication of obviousness.

Applicants respectfully traverse the Office's assertion that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to include the features recited in the claims of Applicants' invention. Such could be possible only in hindsight and in light of Applicants' teachings. Therefore, the rejection is improper at least for that reason and should be withdrawn.

Claims 3-5 have been rejected under 35 USC §103(a), as being unpatentable over U.S. patent 6,296,350 to Cornell et al. ("Cornell") in view of U.S. patent 6,359,701 to Yamada et al. ("Yamada") and further in view of U.S. patent application publication 2003/0137575 to Peterson et al. ("Peterson"). Applicants respectfully traverse the rejection and request reconsideration.

The rejection of dependent claims 3-5 is respectfully traversed at least because the rejection is deficient on its face. These claims depend from independent claim 1. However,

HP Docket No. 100202667-1

independent claim 1 was rejected under 35 USC §103(a), as being unpatentable over 6,296,350 to Cornell et al. ("Cornell") in view of U.S. patent 6,612,673 to Giere et al. ("Giere"). Because "[a] claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers" (35 U.S.C. §112, paragraph 4), a dependent claim must be rejected based on at least all the references on which its base claim was rejected. Here, the Giere reference cited in the rejection base claim 1 is not cited in the rejection of its dependent claims 3-5.

In the absence of conditions such as misjoinder or fundamental defects in the application (conditions which do not exist here), 37 C.F.R. §1.104(b) requires that the "examiner's action will be complete as to all matters". Because there is no rejection of dependent claims 3-5 that is not deficient on its face, Applicant believes that the present Office Action is not complete. Accordingly, Applicant respectfully requests that a proper rejection pursuant to 37 CFR §1.104(c)(2) be issued in a subsequent non-final Action if any of the claims are not found to be allowable. It is noted that claims 3-5 are not amended in the present response.

Claims 6-7 have been rejected under 35 USC §103(a), as being unpatentable over U.S. patent 6,296,350 to Cornell et al. ("Cornell") in view of U.S. patent 6,359,701 to Yamada et al. ("Yamada") and further in view of U.S. patent application publication 2003/0137575 to Peterson et al. ("Peterson"). Applicants respectfully traverse the rejection and request reconsideration.

The rejection of independent claim 6, and its dependent claim 7, is respectfully traversed for at least the following reasons. Claim 6 recites:

"6. (Currently amended) A printing system, comprising:
an inkjet printhead having plural portions each having an ink-ejecting nozzle;
plural heater elements each associated with one of said plural portions to pre-warm ink dispensed by the nozzle of said associated portion in response to a pre-warming signal; and
a controller configured to generate the pre-warming signal for one or more heater elements based on a selection criteria for generating the pre-warming signal only when the nozzle of said associated portion is required to eject ink during an upcoming print swath, wherein the selection criteria is based upon a desired print quality of a resulting image formed by ink ejection

HP Docket No. 100202667-1

of selected nozzles, and wherein the pre-warming signal is generated before starting to print the upcoming print swath." (emphasis added)

The Office has not established a *prima facie* case of obviousness at least because the applied references do not teach or suggest all of Applicant's claim limitations.

For similar reasons as have been explained heretofore with regard to claim 1, the Cornell reference does not teach or suggest the limitations of the controller element and the pre-warming signal recited in claim 6, alone or in combination with the Yamada and Peterson references.

The Office does not cite the Yamada reference as teaching such limitations, and Applicant believes the Yamada reference does not teach or suggest this limitation, alone or in combination with the Cornell and Peterson references.

The Office does not cite the Peterson reference as teaching such limitations, and Applicant believes the Peterson reference does not teach or suggest this limitation, alone or in combination with the Cornell and Yamada references.

Therefore, for the reasons discussed herein, the applied references do not teach or suggest all of Applicant's claim limitations.

Furthermore, the Office has not established a *prima facie* case of obviousness at least because there is no suggestion or motivation to modify the reference or to combine reference teachings. It is respectfully believed that the stated motivations are conclusory statements of generalized advantages and convenient assumptions that are too vague and not specific enough to ascertain a motivation in one or the other for combining.

Applicants respectfully traverse the Office's assertion that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to include the features recited in the claims of Applicants' invention. Such could be possible only in hindsight and in light of Applicants' teachings. Therefore, the rejection is improper at least for that reason and should be withdrawn.

Claim 14 has been rejected under 35 USC §103(a), as being unpatentable over U.S.

HP Docket No. 100202667-1

patent 6,612,673 to Giere et al. ("Giere") in view of U.S. patent 6,296,350 to Cornell et al. ("Cornell"). Applicants respectfully traverse the rejection and request reconsideration.

Claim 14 recites:

"14. (Currently amended) A method of pre-warming a multi-color inkjet printhead having plural portions dispensing ink, comprising:
analyzing an upcoming print swath;
determining from said analyzing which of said plural portions are a dispensing portion required to dispense ink, and which of said plural portions are a non-dispensing portion not required to dispense ink during printing of said upcoming print swath;
generating a pre-warming signal for said dispensing portion;
pre-warming said dispensing portion in response to the pre-warming signal; and
omitting generation of a pre-warming signal for said non-dispensing portion to produce no pre-warming thereof,
wherein the pre-warming signal to the dispensing portion is generated in accordance with a predefined selection criteria that specifies an event after which the pre-warming signal ceases."
(emphasis added)

The Office has not established a *prima facie* case of obviousness at least because the applied references do not teach or suggest all of Applicant's claim limitations. Claim 14 has been amended to include the limitations of claim 34, which the Office has indicated as allowable subject matter.

Therefore, for this reason, the applied references do not teach or suggest all of Applicant's claim limitations.

Furthermore, the Office has not established a *prima facie* case of obviousness at least because, for similar reasons as discussed heretofore with regard to claim 1, there is no suggestion or motivation to modify the reference or to combine reference teachings.

Applicants respectfully traverse the Office's assertion that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to include the features recited in the claims of Applicants' invention. Such could be possible only in hindsight and in light of Applicants' teachings. Therefore, the rejection is improper at least for that reason and should be withdrawn.

HP Docket No. 100202667-1

Claims 15 and 17 have been rejected under 35 USC §103(a), as being unpatentable over U.S. patent 6,359,701 to Yamada et al. ("Yamada") in view of U.S. patent 6,296,350 to Cornell et al. ("Cornell"). Applicants respectfully traverse the rejection and request reconsideration.

The rejection of independent claims 15 and 17 is respectfully traversed for at least the following reasons. Claim 15 recites:

"15. (Currently amended) A method of pre-warming a multi-color inkjet printhead having plural portions dispensing ink, comprising:
determining a type of media upon which an image is to be printed; and
in response to said determining, selecting which of said plural portions are a dispensing portion required to dispense ink for printing of a print swath, and which of said plural portions are a non-dispensing portion not required to dispense ink during printing of the print swath upon said determined type of media;
generating a pre-warming signal for said dispensing portion before beginning printing of the print swath;
pre-warming said dispensing portion in response to the pre-warming signal before beginning printing of the print swath; and
omitting generation of a pre-warming signal for said non-dispensing portion to produce no pre-warming thereof." (emphasis added)

Claim 17 recites:

"17. (Currently amended) A method of pre-warming a multi-color inkjet printhead having plural portions dispensing ink, comprising:
determining a print quality for printing an upcoming image;
in response to said determining, selecting which of said plural portions are a dispensing portion required to dispense ink for printing of a print swath, and which of said plural portions are a non-dispensing portion not required to dispense ink during printing of said upcoming image;
generating a pre-warming signal for said dispensing portion before beginning printing of the print swath;
pre-warming said dispensing portion in response to the pre-warming signal before beginning printing of the print swath; and
omitting generation of a pre-warming signal for said non-dispensing portion to produce no pre-warming thereof." (emphasis added)

The Office has not established a *prima facie* case of obviousness at least because the applied references do not teach or suggest all of Applicants' claim limitations.

The Office admits the Yamada reference does not teach "generating a pre-warming signal

HP Docket No. 100202667-1

for said dispensing portion; pre-warming said dispensing portion in response to the pre-warming signal; and omitting generation of a pre-warming signal for said non-dispensing portion to produce no pre-warming thereof" (Office Action, p.13 re claim 15 and p.14 re claim 17).

Instead, the Office states that the Cornell reference teaches these limitations. However, claims 15 and 17 have been amended to recite that the pre-warming occurs before beginning printing of the print swath. For similar reasons as discussed heretofore with regard to claim 1, the Cornell reference does not teach or suggest, alone or in combination with the Yamada reference, that the pre-warming occurs before beginning printing of the print swath.

Therefore, for the reasons discussed herein, the applied references do not teach or suggest all of Applicants' claim limitations.

Furthermore, the Office has not established a *prima facie* case of obviousness at least because there is no suggestion or motivation to modify the reference or to combine reference teachings. It is respectfully believed that the stated motivations are conclusory statements of generalized advantages and convenient assumptions that are too vague and not specific enough to ascertain a motivation in one or the other for combining.

Applicants respectfully traverse the Office's assertion that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to include the features recited in the claims of Applicants' invention. Such could be possible only in hindsight and in light of Applicants' teachings. Therefore, the rejection is improper at least for that reason and should be withdrawn.

Claims 16 and 18-19 have been rejected under 35 USC §103 (a), as being unpatentable over U.S. patent 6,612,673 to Giere et al. ("Giere") in view of U.S. patent 6,296,350 to Cornell et al. ("Cornell"), and further in view of U.S. patent 6,634,735 to Silverbrook. ("Silverbrook"). Applicants respectfully traverse the rejection and request reconsideration at least based on the dependence of these claims on independent claim 14, whose reasons for allowability over the

HP Docket No. 100202667-1

Giere and Cornell references have been discussed heretofore and against which the Silverbrook reference has not been cited. In addition, the stated motivation to combine the references is improper in that it is merely a conclusory statement of generalized advantages that impermissibly uses the Applicants' disclosure as a blueprint or in hindsight for the rejection. Therefore, the rejection is improper at least for these reasons and should be withdrawn.

Claims 31-32 have been rejected under 35 USC §103 (a), as being unpatentable over U.S. patent 6,296,350 to Cornell et al. ("Cornell") in view of U.S. patent 6,612,673 to Giere et al. ("Giere"), and further in view of U.S. patent 6,359,701 to Yamada et al. ("Yamada"). Applicants respectfully traverse the rejection and request reconsideration at least based on the dependence of these claims on independent claim 1, whose reasons for allowability over the Cornell and Giere references have been discussed heretofore and against which the Yamada reference has not been cited. In addition, the stated motivation to combine the references is improper in that it is merely a conclusory statement of generalized advantages that impermissibly uses the Applicants' disclosure as a blueprint or in hindsight for the rejection. Therefore, the rejection is improper at least for these reasons and should be withdrawn.

Claims 35-36 have been rejected under 35 USC §103 (a), as being unpatentable over U.S. patent 6,296,350 to Cornell et al. ("Cornell") in view of U.S. patent 6,612,673 to Giere et al. ("Giere"). Applicants respectfully traverse the rejection and request reconsideration at least based on the dependence of these claims on independent claim 1, whose reasons for allowability over the Cornell and Giere references have been discussed heretofore and against which the Yamada reference has not been cited. In addition, the stated motivation to combine the references is improper in that it is merely a conclusory statement of generalized advantages that impermissibly uses the Applicants' disclosure as a blueprint or in hindsight for the rejection. Therefore, the rejection is improper at least for these reasons and should be withdrawn.

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HP Docket No. 100202667-1

Formalities

Allowable Subject Matter

Claims 12, 20, 24-25, 27, and 33-34 have been objected to as being dependent upon a rejected base claim and have been indicated as being allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims.

Applicants note that claims 12, 20, 24-25, and 27 were rewritten in independent form in response to the previous Office Action, and thus it is believed that these claims are allowable in their present form.

With this Amendment, Applicants have rewritten allowable claims 33-34 in independent form to include all of the limitations of the base claim (claim 1) and any intervening claims (none).

Applicants, therefore, respectfully request that the objections to these claims be withdrawn and that claims 12, 20, 24-25, 27, and 33-34 be deemed allowed.

Comments on Statement of Reasons for Allowance

Applicants agree with the Office's conclusion regarding patentability, without necessarily agreeing with or acquiescing in the reason(s) set forth in the Office Action. In particular, applicants wish to emphasize that the patentability of claims stems from the respective combinations of elements defined by the claims, each viewed as a whole, rather than the presence of any particular element(s) in the combinations. Applicants submit that the indicated claims are allowable because the prior art fails to anticipate, teach, suggest, or render obvious the invention as claimed, independent of how the invention is paraphrased. Applicants thus rely on the claims, as drafted, rather than any characterization in the Office Action.

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HP Docket No. 100202667-1

Conclusion

Attorney for Applicant(s) has reviewed each one of the cited references made of record and not relied upon, and believes that the claims presently on file in the subject application patentably distinguish thereover, either taken alone or in combination with one another.

Therefore, all claims presently on file in the subject application are in condition for immediate allowance, and such action is respectfully requested. If it is felt for any reason that direct communication with Applicant's attorney would serve to advance prosecution of this case to finality, the Examiner is invited to call the undersigned Robert C. Sismilich, Esq. at the below-listed telephone number.

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FEB 16 2007

IIP Docket No. 100202667-1

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Respectfully submitted,



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